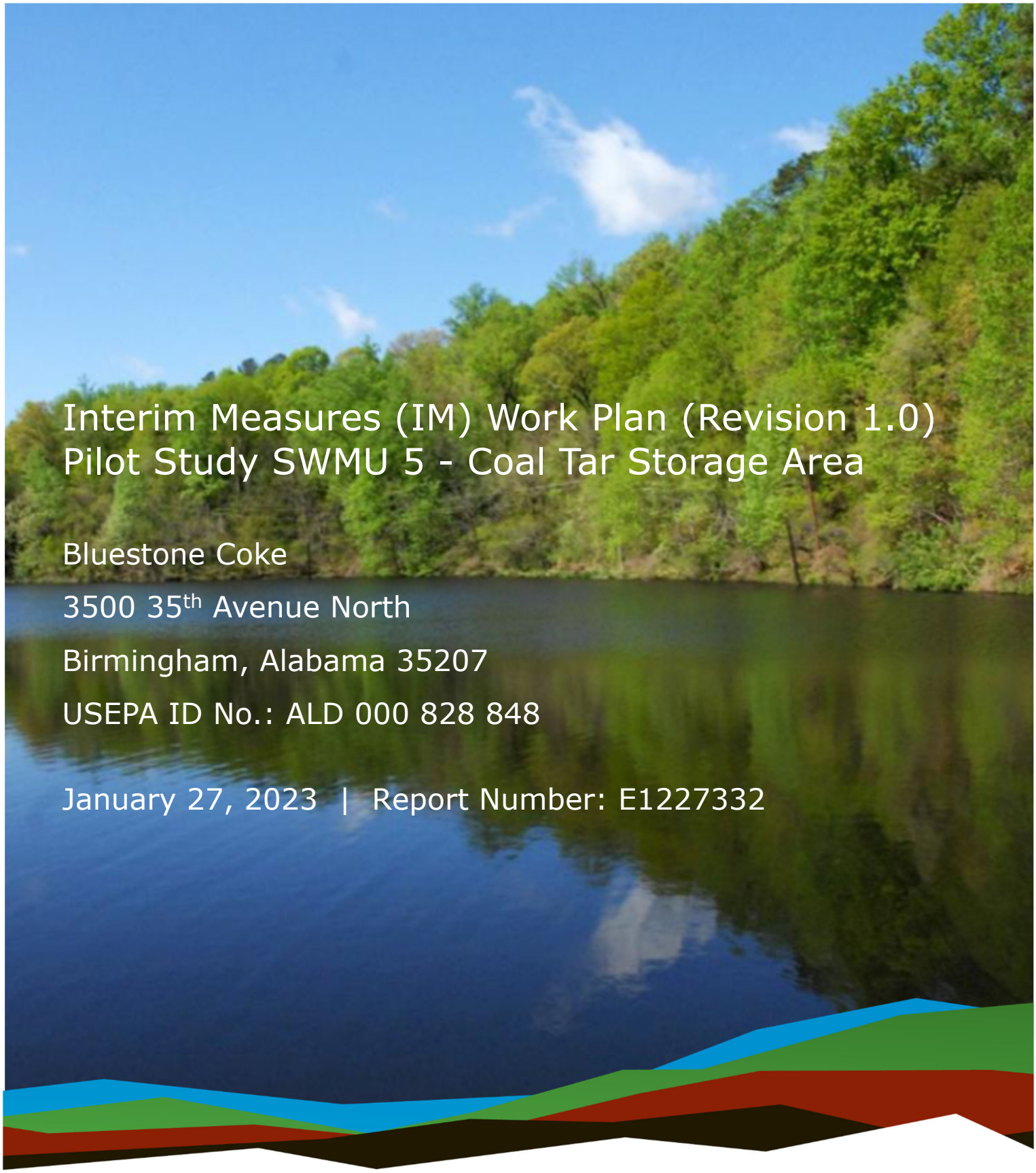

# Interim Measures (IM) Work Plan (Revision 1.0)
# Pilot Study SWMU 5 - Coal Tar Storage Area

Bluestone Coke

3500 35th Avenue North

Birmingham, Alabama 35207

USEPA ID No.: ALD 000 828 848

January 27, 2023 | Report Number: E1227332

Terracon

Nationwide

Terracon.com

- Facilities
- Environmental
- Geotechnical
- Materials

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Birmingham, AL 35244
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January 27, 2023

Bluestone Coke
4200 F.L. Shuttlesworth Drive
Birmingham, Alabama 35207

Attention: Mr. Don Wiggins

Re: **Interim Measures (IM) Work Plan (Revision 1.0)**
**Pilot Study SWMU 5 – Coal Tar Storage Area**
**Bluestone Coke**
**3500 35th Avenue North**
**Birmingham, Jefferson County, Alabama 35207**
**USEPA ID No. ALD 000 828 848**
Terracon Project No. E1227332

Dear Mr. Wiggins:

Terracon Consultants, Inc. (Terracon) is pleased to provide this Interim Measures (IM) Work Plan (Revision 1.0), Pilot Study SWMU 5- Coal Tar Storage Area for the above-referenced site. This Work Plan has been prepared in response to the *Interim Measures Work plan (IMWP) Soil and Groundwater SWMU Management Area (SMA) 3 – Coke Manufacturing Area* letter from EPA dated October 11, 2022.

If you should have any questions, please do not hesitate to contact us at (205) 942-1289.

Sincerely,
**Terracon**

Terrell W. Rippstein, AL-PG
Principal Geologist

Andy Smith, AL-PE
Manager, Environmental Services

Cc: Mr. Don Wiggins – Bluestone Coke
James H. Smith - EPA
ADEM

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# List of Acronyms

ADEM ..... Alabama Department of Environmental Management

AMSL ..... Above Mean Sea Level

CMI ..... Corrective Measures Implementation

CMS ..... Corrective Measures Study

CW ..... Containment Well

DQA ..... Data Quality Assessment

DQO ..... Data Quality Objective

EPA ..... Environmental Protection Agency

CMP ..... Former Chemical Plant

Gal/min ..... gallon per minute

GC ..... Gas Chromatograph

IM ..... Interim Measures

IMWP ..... Interim Measures Work Plan

ISCO ..... In-situ Chemical Oxidation

LCS ..... Laboratory Control Sample

MCL ..... Maximum Contaminant Level

MS/MSD ..... Matrix Spike/Matrix Spike Duplicate

NTU ..... Nephelometric Turbidity Units

PAH ..... Polycyclic Aromatic Hydrocarbon

PARCC ..... Precision, Accuracy, Representativeness, Completeness, and Comparability

PE ..... Professional Engineer

PG ..... Professional Geologist

QA ..... Quality Assurance

QC ..... Quality Control

RCRA ..... Resource Conservation and Recovery Act

RFI ..... RCRA Facility Investigation

RPD ..... Relative Percent Difference

RSL ..... Regional Screening Level

RSS ..... Regenesis Remediation Services

SVOC ..... Semi-Volatile Organic Compound

SWMU ..... Solid Waste Management Unit

TSOP ..... Terracon Standard Operating Procedures for EPA Brownfields

USEPA ..... United States Environmental Protection Agency

VOC ..... Volatile Organic Compound

# 1.0 Introduction

This Interim Measures (IM) Pilot Study Work Plan (Plan) for SWMU 5 - Coal Tar Storage Drainage System was prepared by Terracon Consultants, Inc. (Terracon) for use at the Bluestone Coke, LLC (Bluestone Coke) facility located at 3500 35th Avenue North in Birmingham, Jefferson County, Alabama (**Figure 1**). The Work Plan was requested by the USEPA in a letter dated October 11, 2022. Project activities will focus on the area around SWMU 5 located in SMA 3 – Coke Manufacturing Plant (CMP).

Based on EPA's letter, this Interim Measures Work Plan will detail plans for monitoring, construction, and implementation of both the in-situ soil treatment and in-situ groundwater treatment as a pilot study for SWMU 5. The in-situ soil source treatment and in-situ groundwater treatment will be implemented as a focused Pilot Study to demonstrate the effectiveness of the remedy prior to public notice as a final remedy by EPA. The pilot study will present the opportunity to study the efficacy of the remedy and adjust the remedy as needed to meet the groundwater protection standards and assist in designing a comprehensive remediation system in the Corrective Measures Implementation Plan (CMI). Should the interim measures implemented prove effective it shall be a component of the final remedy that EPA shall propose in the Statement of Basis for Public Notice and Public Comment. EPA is requesting that Bluestone Coke select an area within SMA 3 that has naphthalene at concentrations in the soil and groundwater that exceed the preliminary cleanup standards (PCS) discussed in the CMS. EPA recommends the pilot study area for the Plan be in the vicinity of SWMU #5 Coal Tar Storage Drain System where the impacts to soil and groundwater exceed the PCS

This Plan will be supplemented by the site-specific health and safety plan (HASP) and Quality Assurance Project Plan (QAPP) dated August 30, 2018, which were previously submitted under separate cover to USEPA.

## 1.1 Site Name or Sampling Area

The Pilot Study is being conducted at the Bluestone Coke facility in the area known as SWMU 5 - Coal Tar Storage Drainage System which is located within SMA 3.

## 1.2 Site or Sampling Area Location

The Bluestone Coke facility is located at 3500 35th Avenue North in Birmingham, Alabama.

## 1.3 Responsible Agency

Terracon will be implementing the IM Workplan for Bluestone Coke. The lead regulatory agency is the USEPA Region 4.

## 1.4 Project Organization

The *project organizational chart and table* included below illustrates the projected project team for the IM activities. However, subcontractors performing IM field activities (drilling, sampling, and laboratory analysis) may change. Any changes in subcontractors from those illustrated and discussed below will be included in a Plan Addendum. Subsequent sections discuss key personnel roles associated with each project.

**Project Organizational Chart**

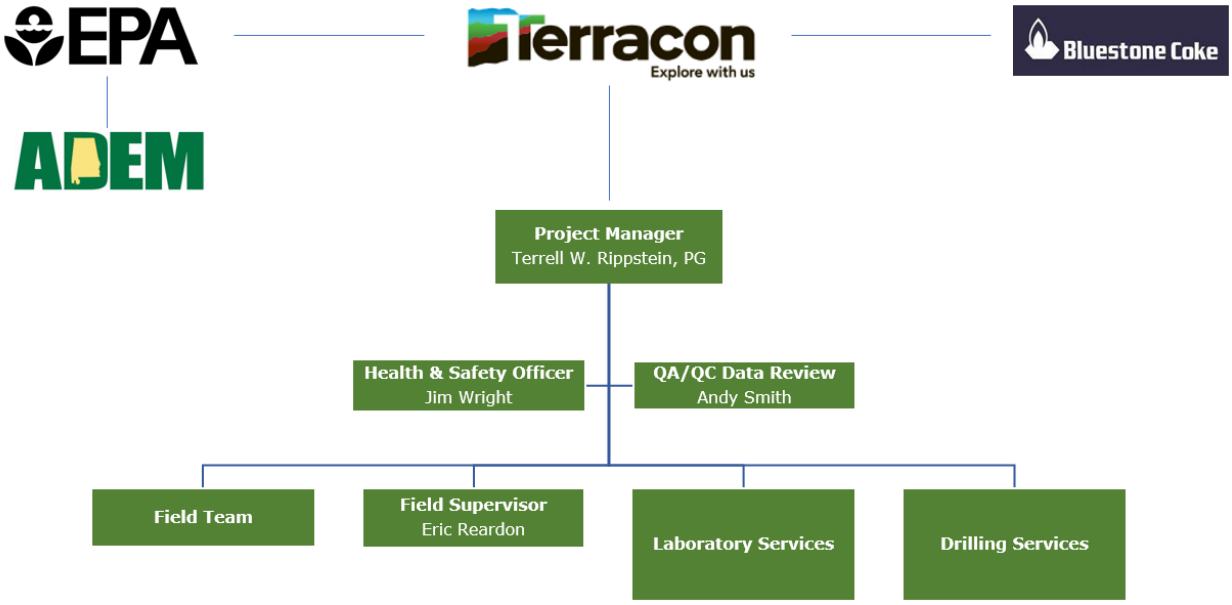

**Table 1. Project Organization**

| Title/Responsibility | Name | Phone Number |
|---|---|---|
| USEPA Project Manager | James H. Smith | (770) 853-8318 |
| ADEM | Chief, Engineer Services Section | (334) 271-7700 |
| Bluestone Coke Manager | Don Wiggins | (205) 516-0348 |
| Terracon Project Manager | Terry Rippstein | (205) 443-5244 |
| Quality Assurance Manager | Andy Smith | (205) 443-5249 |
| Field Supervisor | Eric Reardon | (205) 443-5218 |
| Eurofins (Analytical) | Leah Klingensmith | (615) 301-5038 |
| Geolab Drilling | Joe Granthem | (770) 868-5407 |
| Technical Drilling (Drilling) | Dette Lee | (205) 758-7454 |

Project activities will be organized and conducted in accordance with this Plan. Activities will be performed using various Terracon resources, relevant subcontractor resources, and management guidance and oversight from Bluestone Coke and the USEPA. The local project office for this assessment is the Terracon office in Birmingham, Alabama.

### 1.4.1 Terracon Project Manager

The Terracon Project Manager provides technical guidance, administration, and resources to direct project QA. A strong working knowledge of state and federal regulatory programs is essential to the position. ***Mr. Terrell W. Rippstein, P.G.*** fills this role with more than 32 years of relevant experience. Mr. Rippstein draws local resources and staffing primarily from the Terracon office in Birmingham, Alabama. Mr. Rippstein will interact with the USEPA directly as needed. Mr. Rippstein is located less than fifteen miles from the Bluestone Coke facility. His oversight and technical duties beyond this project do not require more than short, regional travel.

### 1.4.2 QA/QC Reviewer

The QA/QC Reviewer (Terracon) provides documentation audits and technical review to assist in promoting, implementing, and documenting QA compliance. The QA/QC Reviewer is isolated from the implementation chain-of-command. This allows lateral support as a peer to the Project Manager without introducing unintentional biases from conducting the work. The QA/QC Reviewer must have extensive environmental and regulatory assessment experience at both the state and federal levels. **Mr. Andy Smith, P.E.** fills this roll. Mr.

Smith has over twenty years' experience in the environmental field. Mr. Smith is a senior member of the firm with extensive environmental and regulatory assessment and remediation experience.

### 1.4.3 Site Personnel

Terracon site personnel will have completed the Occupational Safety and Health Administration basic 40-hour health and safety training course, Hazardous Waste Operations and Emergency Response (HAZWOPER), including annual refreshers. Terracon field staff also complete in-house training modules on-line through the *Terracon Learning System* (TLS), an online training system available via live webcasts, recorded webcasts, and self-paced online and offline options. Materials covered include: sample collection protocols, conventional and direct push drilling investigation techniques, decontamination procedures, and IDW management. TLS modules also include a "lessons learned" element designed to familiarize field staff with common problems encountered during field data collection and the appropriate corrective measures as a response to those problems. All training records will be maintained in Terracon's Corporate Headquarters in Olathe, Kansas.

## 1.5 Statement of the Specific Problem

Bluestone Coke located in Birmingham, Jefferson County, Alabama, has been conducting a Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) since 1990 in accordance with the regulations set forth by the RCRA Hazardous and Solid Waste Amendments (HSWA) to evaluate past waste management practices at its Birmingham, Alabama, facility. During the RFI, a groundwater plume was identified in SMA 3 located at the southeastern portion of the facility (Figure 2). Chemicals identified in groundwater beneath SMA 3 at concentrations above their respective maximum contaminant levels (MCLs) include benzene, naphthalene, and several other volatile organic compounds (VOCs), semi-volatile organic Compounds (SVOCs) and metals. Corrective Measures Study (CMS) SMA 3 – CMP (Revision 1.0) was submitted to EPA on October 21, 2021. On October 11, 2022, EPA requested in a letter that a Pilot Test be performed around SWMU 5 in SMA 3 to determine if the corrective measures recommended in the CMS are effect to remediate soil and groundwater. The constituents of concern in SWMU 5 for this Pilot Test are naphthlene and benzene.

# 2.0 Background

## 2.1 Site or Sampling Area Description

The Bluestone Coke Facility is located in an industrial area in the northern portion of Birmingham, Alabama. SMA 3 is located in the southwestern portion of the site (Figure 2). SWMU 5 is located in the southeastern portion of SMA 3 are shown on Figure 2.

## 2.2 Geological Information

The facility is underlain by sedimentary rocks that range in age from Cambrian to Pennsylvanian. The Opossum Valley Fault generally trends northeast to southwest, crossing through the Bluestone Coke property in the northern portion of the facility at the Polishing Pond (SWMU 22). The majority of the Bluestone Coke property lies on the hanging wall fault block to the east of the Opossum Valley Fault. The foot wall of the fault lies to the west and underlies Sand Mountain. The majority of the Bluestone Coke property is underlain by the Conasauga Formation. The Red Mountain Formation, Fort Payne Formation, Tuscumbia Limestone, Hartselle Sandstone, Floyd Shale, and Pottsville Formation outcrop in a small area of the facility on the western side of the fault.

The Conasauga Formation is Cambrian-Aged and typically is medium gray, thin- to medium-bedded limestone. Locally, bedding thickness is reported to range from a few inches to as much as 5 feet or more in the massive sections. Locally, the Conasauga Formation dips to the southeast at 26 to 32 degrees, with a strike of approximately N45°E. An extensive network of faults and joints has developed in the Conasauga Limestone because of thrust faulting. The faults and joints typically trend northeast and northwest. The northeast trending joints (strike of N45°E) dip approximately 60°NW (approximately perpendicular to bedding), while the northwest trending joints strike 300°NW and have subvertical dips. The results of previous investigations indicate that the upper 2 feet of the Conasauga Formation underlying the Bluestone Coke facility are highly weathered. Below the weathered surface, the limestone is generally massive, with few fractures. The limestone is typically hard, with 1- to 2-foot-thick lenses of softer, darker gray shale and shaley limestone. Occasionally, fractures are present, ranging from a few inches to a few feet thick. Fracture zones typically contain limestone rubble that exhibits secondary healing by calcite crystals. Fracture zones typically are encountered in the upper 50 feet of the formation and are less frequent with increasing depth. On the western side of the Opossum Valley Fault (in the SWMU 23 area), outcrops of the Hartselle Sandstone, Tuscumbia Limestone, Fort Payne Chert, Red Mountain Formation, and Pottsville Formation have been mapped. Brief descriptions of these units are provided below:

- Hartselle Sandstone – consists mainly of clean, well-sorted, light-colored, very fine- to medium-grained quartz sand;
- Tuscumbia Limestone – consists of thick-bedded, medium-dark to medium-gray, crystalline, oolitic, sublithographic, and bioclastic limestone with minor amounts of chert;
- Fort Payne Chert – consists of dark-gray sublithographic limestone and dense dark-gray chert;
- Red Mountain Formation – consists of dark-reddish-brown to olive-gray siltstone, sandstone, and shale with hematite beds; and
- Pottsville Formation – consists of alternating beds of sandstone and shale with numerous coal seams and associated underclays.

The topography of the bedrock underlying the Bluestone Coke facility generally slopes to the north toward Five Mile Creek. Top-of-bedrock elevations range from 583.1 feet amsl in the Coke Plant area to 498.6 feet amsl near Five Mile Creek. Weathering of the Conasauga Formation has produced undulations in the surface of the bedrock. Several feet of relief have developed on the bedrock surface. This relief is as much as several tens of feet in some areas of the property; however, karst features are not evident at the ground surface. Where exposed, enlargement of bedding planes and fractures appears to have occurred through solution of the bedrock. Solutionally enlarged fractures and joints primarily are limited to the upper few feet of bedrock and have been observed up to 1 foot wide.

The following text presents the current conceptual hydrogeologic flow mode. The conceptual hydrogeologic flow model is composed of residuum groundwater, shallow bedrock groundwater, and deep bedrock groundwater. Groundwater occurs within the residuum where the water table is higher than the bedrock surface. Groundwater flow through this material occurs in interstitial pore spaces between the clay particles at a low rate due to the relatively low permeability. Flow rates may be higher where a concentration of chert gravels at the bedrock surface has occurred, although based on borehole observations, such occurrence is limited. Within the shallow and deep bedrock aquifers, groundwater migrates along fractures and bedding planes both horizontally and vertically. Within the shallow bedrock aquifer, groundwater flow is primarily horizontal due to the interconnectivity of the fractures. Groundwater within the shallow bedrock discharges to surface water bodies such as the Lafarge and Southern Ready Mix Quarries, surface drainage ditches, and Five Mile Creek. Deep bedrock groundwater probably migrates toward discharge points such as the Lafarge and Southern Ready Mix Quarries. The groundwater flow in the area of Five Mile Creek is east towards Shuttlesworth Drive.

# 3.0 Pilot Test

The performance objective of this Pilot Study is to determine if in-situ chemical oxidation/reduction is effective in reducing concentrations of naphthalene and benzene in

the soil and groundwater within the study area around SMWU 5. The study area around SWMU 5 is approximately a 125 feet by 125 feet area (Figure 3). We propose the use of PetroFix Remedial Solution (PetroFix) to remediate the dissolved phase petroleum hydrocarbons in SWMU 5. PetroFix is a proprietary unique activate carbon remedial fluid paired with soluble, anaerobic electron acceptors designed to remediate dissolved hydrocarbons. Regenesis Remediation Services (RSS) is the company that produces Petrofix. A PetroFix specification Sheet and RSS Scope of work are provided in Appendix A. In addition, a case study for PetroFix showing it's effectiveness on BTEX, naphthalene, and TPH-GRO concentrations is included in Appendix A.

## 3.1 Pre- and Post-Injection Soil and Groundwater Sampling

Soil and Groundwater sampling procedures will follow the site specific QAPP (8/30/18) and appropriate EPA Region 4 guidance documents.

### 3.1.1 Soil Sampling

Prior to the start of the Pilot Test, nine soil borings designated 5-SB005A through 5-SB013A will be drilled (Figure 4). The borings will be installed using either the direct push or the hollow-stem auger drilling method. Soil samples will be collected continuously until bedrock refusal. A portion of each 2-foot soil sample interval will be submitted for Analysis of VOCs by EPA Method 8260 and SVOCs by EPA Method 8270. Approximately 6 months after the injection has been performed, 9 additional borings designated 5-SB005B through 5-SB013B will be installed adjacent to the previously installed borings and soil samples will be collected from the same 2-feet intervals and submitted for laboratory analysis of VOCs and SVOCs. QA/QC samples will be collected as appropriate (see Section 3.1.4). Decontamination procedures are presented in Section 3.2.

### 3.1.2 Monitoring Well Installation

In addition to the soil borings, a new temporary monitoring well (designated SWMU5-TW1) will be installed downgradient of the study area (Figure 4). This monitoring well will be a Type II monitoring well that is screened in the upper most water bearing unit.

- Prior to intrusive activities, the appropriate utility notifications are to be made and the dates of intrusive activities will be scheduled. Bluestone will provide additional utility clearance for potential private utility clearance or subsurface structures at the proposed boring location. If there is uncertainty associated with potentially unmarked utilities, the Field Team Leader must suspend work until the issue can be resolved.
- Care will be taken to avoid contamination or cross contamination during monitoring well installation. This will be accomplished by decontaminating all drilling tools, rods, rigs, groundwater pumps, surge blocks, or other development tools, between boreholes, during installation activities, and between wells.

- The temporary monitoring well will be constructed in a manner that prevents the introduction or migration of contamination to a water-bearing zone or aquifer through the casing, drill hole, or annular materials.
- Well installation will be performed using a hollow-stem auger or air hammer rig.
- 2-inch diameter PVC screen (0.010 slot), 2-inch diameter PVC well casing, sand filter pack (20 mesh silica sand, bentonite seal, and cement/bentonite grout will be used to construct the monitoring well. Sand will be placed two-foot about the top of the screen and a bentonite seal of at least 2-foot will be place on top of the sand. Grout will be placed on top of the hydrated bentonite seal to ground surface.
- The surface completion will consist of a protective casing with a locking cover and a water-tight well cap will be installed on the well casing. The protective casing will be installed by pouring a concrete slurry into the borehole to the ground surface and will have a minimum of two ¼-inch weep holes.
- A concrete surface pad will be centered on the well.
- Four protective bollards will be installed around the concrete surface pad.

### 3.1.3 Water-Level Measurements

All field meters will be calibrated according to manufacturer's guidelines and specifications before and after every day of field use. Field meter probes will be decontaminated before and after use at each well. Decontamination and water level measurement procedures will follow the FBQS (http://www.epa.gov/region4/sesd/fbqstp/index.html).

If well heads are accessible, all wells will be sounded for depth to water from top of casing and total well depth prior to purging. An electronic sounder, accurate to the nearest +/- 0.01 feet, will be used to measure depth to water in each well. When using an electronic sounder, the probe is lowered down the casing to the top of the water column, the graduated markings on the probe wire or tape are used to measure the depth to water from the surveyed point on the rim of the well casing. Typically, the measuring device emits a constant tone when the probe is submerged in standing water and most electronic water level sounders have a visual indicator consisting of a small light bulb or diode that turns on when the probe encounters water. Total well depth will be sounded from the surveyed top of casing by lowering the weighted probe to the bottom of the well. The weighted probe will sink into silt, if present, at the bottom of the well screen. Total well depths will be measured by lowering the weighted probe to the bottom of the well and recording the depth to the nearest 0.1 feet.

Water-level sounding equipment will be decontaminated before and after use in each well. Water levels will be measured in wells which have the least amount of known contamination first. Wells with known or suspected contamination will be measured last.

### 3.1.4 Purging

The wells will be purged and sampled using the "low flow method" in accordance with the FBQS found at http://www.epa.gov/region4/sesd/fbqstp/index.html using pumps and tubing specified in the FBQS. Clean flexible, disposable, dedicated tubing will be used for

groundwater extraction. Pumps will be placed as described in the FBQS. Field Measurements of pH using a Multi-parameter Sonde will be monitored during purging.

It is most important to obtain a representative sample from the well. Stable water quality parameter (pH and specific conductance) measurements indicate representative sampling is obtainable. Purging will be considered complete if for three consecutive readings:

- pH varies by no more than 0.1 pH units
- specific conductance readings are within 5% of the average; and
- turbidity is less than 10 NTUs.

If the well casing volume is known, measurements will be taken before the start of purging, in the middle of purging, and at the end of purging each casing volume. If water quality parameters are not stable after 5 casing volumes, purging may cease as described in the FBQS, which will be noted in the logbook, and ground water samples will be taken. The depth to water, water quality measurements and purge volumes will be entered in the logbook.

The "Low Flow" purging method will be used. If used the method described in the FBQS will be used and as with the traditional purging method all chemical parameters will be stable, as described above, prior to sampling.

### 3.1.5 Well Sampling

Once field parameters stabilize and purging is considered complete, the monitoring wells will sampled via low-flow techniques

At each sampling location, all bottles designated for a particular analysis (e.g., VOCs) will be filled sequentially before bottles designated for the next analysis are filled (e.g., SVOCs). If a duplicate sample is to be collected at this location, all bottles designated for a particular analysis for both sample designations will be filled sequentially before bottles for another analysis are filled. Groundwater samples will be transferred from the pump tap directly into the appropriate sample containers with preservative, if required, chilled if appropriate, and processed for shipment to the laboratory. When transferring samples, care will be taken not to touch the tap to the sample container.

Samples for volatile organic compound analyses will be collected as described in the FBQS (http://www.epa.gov/region4/sesd/fbqstp/index.html). Vials for volatile organic compound analysis will be filled first to minimize the effect of aeration on the water sample. The test vials will come from the lab with hydrochloric acid (HCl) for preservation. The vials will be filled directly from the pump tap and capped. The vial will be inverted and checked for air bubbles to ensure zero headspace. If a bubble appears, the vial will be discarded and a new sample will be collected.

The monitoring wells which will be used to evaluate the effectiveness of the IM are listed on below.

| Well ID | Monitored Unit | Screened Interval (ft bgs) | Depth to Bedrock (ft bgs) |
|---|---|---|---|
| MW-58 | SB | 19-29 | 16 |
| MW-59 | SB | 39.5-49.5 | 4 |
| MW-74 | SB | 19-29 | 16.3 |
| MW-75 | SB | 39-49 | 17 |
| SWMU5-TW1* | SB | TBD | TBD |

SB = Shallow Bedrock
TBD = To be determined
*new temporary monitoring well (designated SWMU5-TW1)

Groundwater samples will be collected prior to starting the Pilot Test and analyzed for VOCs, SVOCs, pH, dissolved oxygen, oxidation reduction potential, temperature and specific conductivity. After completion of the PetroFix injection, groundwater will be sampled quarterly for a period of one year for the same constituents to determine the effectiveness of the injection. QA/QC samples will be collected as appropriate (See Section 3.1.4).

### 3.1.6 PostSample Summary

The table below provides a summary of the soil, groundwater, and QA/QC samples to be collected during the Pilot Study. A table of the Method Detection Limits (MDL) and the Reporting Limits (RL) for VOCs and SVOCs in soil and groundwater are included in Appendix B.

| Sample Media | Minimum Number of Samples | Analyses (Method) | Rationale |
|---|---|---|---|
| Groundwater | 5 shallow bedrock monitoring wells | VOCs (8260B)<br>SVOCs (8270D) | Determine effectiveness of the IM. Pre-injection and quarterly for one year post-injection. |

| Sample Media | Minimum Number of Samples | Analyses (Method) | Rationale |
|---|---|---|---|
| Soil | 18 Soil Borings sampled continuously at 2-foot intervals | VOCs (8260B)<br>SVOCs (8270D) | Determine effectiveness of the IM. Nine borings pre-injection and 9 borings post-injection. |
| Field blanks | 1 per 20 samples or 1 per day of field activities | VOCs (8260B)<br>SVOCs (8270D) | Evaluate the effects of ambient conditions and sample containers on accuracy |
| Trip Blanks | 1 per cooler containing samples for VOC analysis | VOCs (8260B) | Evaluate how shipping and handling procedures are affecting accuracy by introducing contaminants into the samples |
| Temperature Blanks | 1 per cooler | Thermometer | Evaluate sample temperature effects on accuracy |
| Equipment blanks | 1 per 20 samples or 1 per day of field activities | VOCs (8260B)<br>SVOCs (8270D) | Evaluate sample equipment and/or field decontamination effects on accuracy |
| Duplicate Samples | 1 for every 10 samples collected | VOCs (8260B)<br>SVOCs (8270D) | Assess the effects of sample collection technique on sample precision |
| Matrix spike/matrix spike duplicate | 1 per 20 samples or 1 per day of field activities | VOCs (8260B)<br>SVOCs (8270D) | Evaluate the matrix effects on sample precision |

Note: For more information on QA/QC samples such as Matrix Spikes or Duplicates. See Section 10.

## 3.2 Decontamination Procedures

The decontamination procedures that will be followed are in accordance with the EPA Region 4 FBQS (http://www.epa.gov/region4/sesd/fbqstp/index.html). Decontamination of sampling equipment must be conducted consistently as to assure the quality of samples collected. All equipment that comes into contact with potentially contaminated soil or water will be decontaminated. Disposable equipment intended for one-time use will not be decontaminated, but will be packaged for appropriate disposal. Decontamination will occur prior to and after each use of a piece of equipment.

The following, to be carried out in sequence, is an USEPA recommended procedure for the decontamination of sampling equipment:

- Non-phosphate detergent and tap water wash, using a brush if necessary
- Tap-water rinse
- Deionized/distilled water rinse
- Deionized/distilled water rinse (twice)

Equipment will be decontaminated in a pre-designated area on pallets or plastic sheeting, and clean bulky equipment will be stored on plastic sheeting in uncontaminated areas. Cleaned small equipment will be stored in plastic bags. Materials to be stored more than a few hours will also be covered.

## 3.3 Analytical Laboratory

Laboratory reporting quality will be enhanced through a formalized process and management system applied to ensure data quality within standard method requirements. Laboratory reporting will occur consistent with the laboratory QA Manuals (Appendix D). In addition, laboratory reports will include a final data quality documentation package for all analyses.

A list of information to be supplied with laboratory data deliverables is as follows:

- Standard QC Data Package Provided by the analytical laboratory, with final analytical report with qualifiers (where necessary)
- Chain of Custody Form
- Method Blank
- Matrix Spike/Spike Duplicate Summary (MS/MSD)-with control limits
- Laboratory Control Sample Summary (LCS)-with control limits
- Reporting Limits listed on all reports
- Surrogate Recoveries for GC and GC/MS analyses (on final report)
- Method Detection Limits (MDLs)

After validation of each laboratory package is completed, laboratory results will be summarized in tabular form. The data summary report will include tabular summaries of analytical testing results, laboratory reports, and a summary of data validation conclusions. In addition to the data summary report, data collected during the project will be summarized in the final report.

Laboratory audit and associated corrective action records will be maintained within laboratory QC records. Individual records may be reviewed as determined relevant to ensure QC on a project-by-project basis. Corrective actions taken in response to audit or QC data review findings will be evaluated by the Terracon Project Manager and/or the QA/QC reviewer and discussed in the final report.

## 3.4 Underground Injection Control Permit

An underground injection control (UIC) permit must be obtained prior to injecting the PetroFix into the subsurface. ERP Coke will apply for a Class V UIC permit from the Alabama Department of Environmental Management (ADEM) within 60 days of approval of this Work Plan. It takes approximately 180 days to receive a UIC permit in Alabama.

## 3.5 PetroFix Injection

The RSS proposal for injection of the PetroFix is included as Appendix A.

RRS will be equipped with multiple injection tool options to use with 1.5-inch diameter DPT rods. The injection tool string will be advanced to the top or bottom of the target treatment zone and injections will be performed in a bottom up or top-down method depending on the site lithology.

The remediation technologies will be mixed in an injection trailer (Figure 2) with water in batches at the designated solution percentage and kept in constant suspension throughout the injection application. Pressures, flow rates, and total volume will be monitored and digitally documented for each injection interval. Simultaneous injection at multiple locations may be conducted to increase efficiencies on-site. RRS will monitor the injection points and surrounding areas for any signs of surfacing, and a spill response kit will be on standby.

During the application, real-time information will be collected and analyzed to help verify design assumptions and subsurface reagent distribution. Depending on the primary product applied, data collected and analyzed may consist of groundwater quality parameters (i.e., pH, conductivity, DO, ORP, etc.), depth-to-water measurements, visual indicators through groundwater or soil samples, and in-field injection concentration test kits. This information is typically collected during the application when operating within 10 feet of an appropriately screened monitoring well. Based on the information collected, the project team may modify

the remediation design to optimize the injection application further. Typical modifications may include injection concentrations, volume per vertical foot, injection intervals, and point spacing.

Once the injection event is completed, RRS will demobilize all equipment and personnel off-site. A detailed injection summary report which includes injection point data (interval depths, injection pressure/flow rates, reagent volume, time elapsed and if surfacing occurred), field observations and any other noteworthy information, will be prepared.

# 4.0 Field Health and Safety Procedures

Terracon will use the site-specific Health and Safety Plan that has been prepared for the facility and previously submitted to EPA. The HASP was prepared in accordance with the requirements set forth in the Occupational Safety and Health Administration Regulation 29 CFR 1910.120, where applicable, and applicable state, city, or local safety codes. The HASP will be reviewed and signed daily by all field personnel prior to field work indicating that they understand the plan and its requirements. Copies of the plan will be maintained on-site and made available to all personnel throughout the investigation activities. A need for special personal protective equipment (PPE) beyond standard Level D is not anticipated. However, should site conditions warrant, all onsite personnel will withdraw to a pre-designated rally point per the site HASP. Further information regarding health and safety considerations is included in the HASP.

# 5.0 Implementation Schedule

A Gantt Chart illustrating the implementation schedule for this Work Plan has been prepared and is included in Appendix C.